Statistics Canada   Statistique Canada
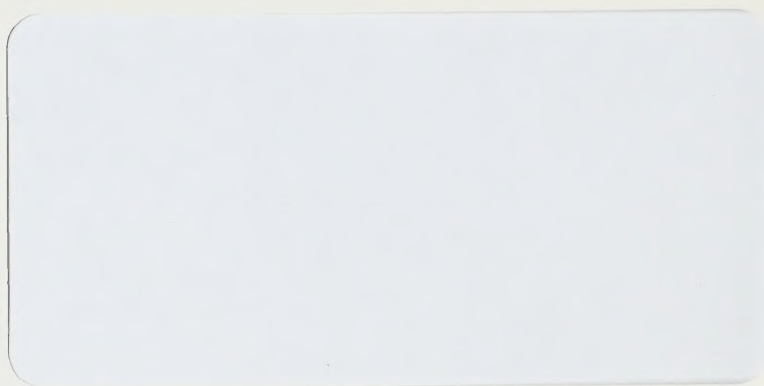
A PROFILE OF FARMERS WITH COMPUTERS

by

Ray D. Bollman

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ABSTRACT

According to the 1986 Census of Agriculture, only a small proportion of all census-farms have a computer that is used "principally in managing your farm business". This paper shows some of the variables that are associated with the use of computers on farms and has suggested the size of the remaining potential market for computers and computer products.

A Profile of Farmers with Computers

1. Introduction

Computers are entering all aspects of business and personal life in our
society. Farms (and agribusiness firms) are adopting computers for a variety
of functions. The purpose of this paper is to profile selected aspects of the
potential market for agriculture computer products, both microcomputers and
supporting software, at the farm level. Specifically, I will discuss:

1. the number of "farms" and "farmers";
2. who had a computer in 1986?; and
3. the potential market for computer products.

2. The Number of "Farms" and "Farmers"

The first question in planning for the agriculture computer products marketplace is the number of "farms" and "farmers" in Canada. In this section, we update a previous analysis of the number of "farms" and "farmers" in Canada (see Bollman, 1983). The number of "farms" and "farmers" appropriate for planning in the agriculture computer products marketplace depends upon the target group for the particular computer product or service being marketed. For example, over 450,000 individuals reported some unincorporated self-employment income from farming on their income tax forms whereas as few as 125,000 individuals are "viable" in the sense that the net farm income alone is over the low-income cut-off (Table 1). It is interesting to note that the number of census-farms with gross sales over $15,000 (constant $1975) has been increasing over time. The provincial distribution of "farmers" under alternative definitions is presented in Table 2.

The number of unincorporated taxfilers whose major source of gross income is from farming has declined only gradually from 290,000 in the late - 1960's to 275,000 today. (Table 1 and Figure 1). Data tabulated from Statistics Canada's Survey of Consumer Finances show that the number of families with one individual with some farm income or with farming as the principal occupation has been level at about 330,000 over the past 10 years (Figure 2). The number of families with one individual with net farm income as the major source has been level at about 220,000 over the past 10 years.

"Farms" and "farmers" can be profiled in numerous ways. Ehrensaft and Bollman (1985) profiled "farms" and suggested that "classic family farms" represented about 50 percent of all census-farms in 1981 and had maintained their share of aggregate production between 1971 and 1981 (Table 3). Clemenson and Bollman (1985) profiled "farmers" to show that census-farm operators with a "strict" full-time occupational committment to farming represented 130,000 operators in 1981 (41 percent of all operators) and the 1981 number had declined 10 percent from the 1971 number (Table 4).

Table 1. Number of "Farmers" under alternative definitions, Canada, 1901-1981

	Census data		Part-time farmer(3)				Labor force survey (7)		Taxation data				
Year	Census-farm operator (1)	Full-time census-farm operator (2)	Part-time off-farm work(4)	Full-time off-farm work(5)	Total	Operator of holdings with gross sales over $15,000, $1975(6)	S/employed in agr Annual average	Number in largest month	Farm taxfiler (8)	Taxfiler with major source of gross income from farming	"Full-time farmer" (9)	"Viable farmer" (10)	Farm taxfiler with low income (11)
1901	511073												
1911	682766												
1921	711090												
1931	728623												
1941	732832	472443	237077	23312	260389								
1951	623091	450999	135558	36534	172092		597000			189060			
1952							557000			196380			
1953							552000			204800			
1954							572000			206760			
1955							543000			205830			
1956							514000			200967			
1957							499000			204855			
1958							472000			205331			
1959							456000			205581			
1960							445000			209720			
1961	480903	327228	112352	41323	153675		436000			209119			
1962							414000			220513			
1963							405000			222645			
1964							397000			234553			
1965							363000			246977			
1966	430522	264799	119643	46080	165723	139450	335000	355000		290587			
1967	417643						337000	378000		292545			
1968	404764						319000	347000		291553			
1969	391886						314000	341000		283859			
1970	379007						296000	317000		276686			
1971	366128	237021	86995	42112	129107	151371	291000	313000	364870	277319	240340		
1972	360618						272000	295000	379135	279714	230945		
1973	355108						267000	287000	388745	285810	238365		
1974	349598						271000	297000	394805	287767	236365	141600	118970
1975	344088						255000	290000	405755	279247	235510	145325	111170
1976	338578	223953	70962	43663	114625	149095	241000	253000	406005	272486	223665	127785	115905
1977	334578						239000	247000	405185	245902	214415	116405	116100
1978	330578						248000	269000	416165	268791	218660	126080	107555
1979	326578						249000	258000	427205	279288	222610	132040	112190
1980	322578						242000	248000	438720	276523	220000	128125	106905
1981	318361	195225	78933	44203	123136	163825	245000	262000	447156		211350	126165	122980

Table 1. (cont') Number of "Farmers" under alternative definitions, Canada, 1901-1981

	Census data						Labor force survey (7) S/employed in agr		Taxation data				
			Part-time farmer(3)			Operator of			Farm taxfiler (8)	Taxfiler with	"Full-time farmer" (9)	"Viable farmer" (10)	Farm taxfiler with
Year	Census-farm operator (1)	Full-time census-farm operator (2)	Part-time off-farm work(4)	Full-time off-farm work(5)	Total	holdings with gross sales over $15,000, $1975(6)	Annual average	Number in largest month		major source of gross income from farming			low income (11)
				as percent of number of census-farm operators									
1941	100	64	32	3	36								
1951	100	72	22	6	28		96			30			
1961	100	68	23	9	32		91			43			
1962													
1963													
1964													
1965													
1966	100	62	28	11	38	32	78	82		67			
1967							81	91		70			
1968							79	86		72			
1969							80	87		72			
1970							78	84		73			
1971	100	65	24	12	35	41	79	85	100	76	66		
1972							75	82	105	78	64		
1973							75	81	109	80	67		
1974							78	85	113	82	68	41	34
1975							74	84	118	81	68	42	32
1976	100	66	21	13	34	44	71	75	120	80	66	38	34
1977							71	74	121	73	64	35	35
1978							75	81	126	81	66	38	33
1979							76	79	131	86	68	40	34
1980		6)					75	77	136	86	68	40	33
1981	100	~~66~~	25	14	39	51	77	82	140		66	40	39

Sources: Canada. Statistics Canada. Censuses of Agriculture, 1901-1981.
The Labour Force (Catalogue No. 71-001)
Unpublished taxation statistics

(1) A census-farm operator is the person responsible for the day-to-day operation of a census-farm. The definition of a a census-farm has changed somewhat over the years. Since 1961, it represents a holding of one acre or more with gross sales of $50 or more in the previous year($250 in 1981). Data are interpolated between census years.
(2) A full-time farmer is a census-farm operator who reports no days of off-farm work.
(3) A part-time farmer is a census-farm operator who reports some days of off-farm work.
(4) Part-time off-farm work is 1-128 days of work off the census-farm holding.
(5) Full-time off-farm work is over 228 days of work off the census-farm holding.
(6) Operators of holdings with gross sales over $15,000($1975) were estimated after correcting for the change in the prices of farm outputs.
(7) The labour force survey estimates the number of people who were self-employed in agriculture during the reference week.
(8) A farm taxfiler is an individual who reports positive gross or non-zero net (unincorporated) self-employment income from farming. The subsequent columns present subsets of the farm taxfiler group.
(9) A "full-time farmer" is a farm taxfiler with net farm income being the major source of income.
(10) A "viable farmer" is a farm taxfiler with net farm income greater than the Statistics Canada low-income cutoff (adjusted for family size).
(11) Farm taxfilers with "low income" are taxfilers with total net income (excluding capital gain) being less than the Statistics Canada low-income cutoff (adjusted for family size).

Table 2. Number of "Farmers" in 1981 under alternative definitions, Canada and Provinces, 1981

	Census data			Part-time farmer(3)			Taxation data						
Prov	Census-farm operator (1)	Full-time census-farm operator (2)	Part-time off-farm work(4)	Full-time off-farm work(5)	Total	Operator of holdings with gross sales over $15,000, $1975(6)	Farm taxfiler (7)	Taxfiler with major source of gross income from farming (1980)	"Full-time farmer" (8)	"Viable farmer" (9)	Farm taxfiler with low income (10)	"Full-time (8) AND viable (9)"
NFLD	651	373	182	96	278	149	638	236	240	55	250	55
PEI	3145	2005	802	338	1140	1575	3523	2548	1825	790	1495	730
NS	5029	2622	1427	980	2407	1319	5849	2594	1935	700	1945	630
NB	4054	2254	1108	692	1800	1300	5035	2144	1775	550	1760	520
QUE	48100	32658	10986	4456	15442	23059	47388	32646	25545	10895	16955	10360
ONT	82389	45992	19955	16442	36397	38443	118983	70800	45905	24595	34995	21845
MAN	29405	19014	7321	3070	10391	17024	45929	32202	24270	12770	15435	11250
SASK	67084	46188	15178	5718	20896	45005	95119	69392	57075	44600	19605	38610
ALTA	57933	33858	16059	8016	24075	30665	94768	53177	41165	27670	23010	23340
BC	19968	9723	5870	4375	10245	5486	29924	10438	7620	3530	7525	2340
CAN	317758	194687	78886	44183	123071	163825	447156	276523	211350	126165	122980	110180

as percent of number of census-farm operators in each province

Nfld	100	57	28	15	43	23	98	36	37	8	38	8
PEI	100	64	26	11	36	44	112	81	58	25	48	23
NS	100	52	28	19	48	26	116	52	38	14	39	13
NB	100	56	27	17	44	32	124	53	44	14	43	13
QUE	100	68	23	9	32	48	99	68	53	23	35	22
ONT	100	56	24	20	44	47	144	86	61	30	42	27
MAN	100	65	25	10	35	58	156	110	83	43	52	38
SASK	100	69	23	9	31	67	142	103	85	66	29	58
ALTA	100	58	28	14	42	53	164	92	71	48	40	40
BC	100	49	29	22	51	27	150	52	38	18	38	14
CAN	100	61	25	14	39	52	141	87	67	40	39	35

as percent of number of individuals in each group

Nfld	0	0	0	0	0	0	0	0	0	0	0	0
PEI	1	1	1	1	1	1	1	1	1	1	1	1
NS	2	1	2	2	2	1	1	1	1	1	2	1
NB	1	1	1	2	1	1	1	1	1	0	1	0
QUE	15	17	14	10	13	14	11	12	12	9	14	9
ONT	26	24	25	37	30	23	27	26	24	19	28	20
MAN	9	10	9	7	8	10	10	12	11	10	13	10
SASK	21	24	19	13	17	27	21	25	27	35	16	35
ALTA	18	17	20	18	20	19	21	19	19	22	19	21
BC	6	5	5	7	10	3	7	4	4	3	6	3
CAN	100	100	100	100	100	100	100	100	100	100	100	100

Sources: Canada. Statistics Canada. Census of Agriculture, 1981.
Unpublished taxation statistics

(1) Operators of institutional farms, community pastures, and farms in the Yukon and Northwest Territories are excluded.
(2) A full-time farmer is a census-farm operator who reports no days of off-farm work.
(3) A part-time farmer is a census-farm operator who reports some days of off-farm work.
(4) Part-time off-farm work is 1-128 days of work off the census-farm holding.
(5) Full-time off-farm work is over 228 days of work off the census-farm holding.
(6) Operators of holdings with gross sales over $15,000($1975) were estimated after correcting for the change in the prices of farm outputs.
(7) A farm taxfiler is an individual who reports positive gross or non-zero net (unincorporated) self-employment income from farming. The subsequent columns present subsets of the farm taxfiler group.
(8) A "full-time farmer" is a farm taxfiler with net farm income being the major source of income.
(9) A "viable farmer" is a farm taxfiler with net farm income greater than the Statistics Canada low-income cutoff.
(10) Farm taxfilers with "low income" are taxfilers with total net income (excluding capital gain) being less than the Statistics Canada low-income cutoff (adjusted for family size).
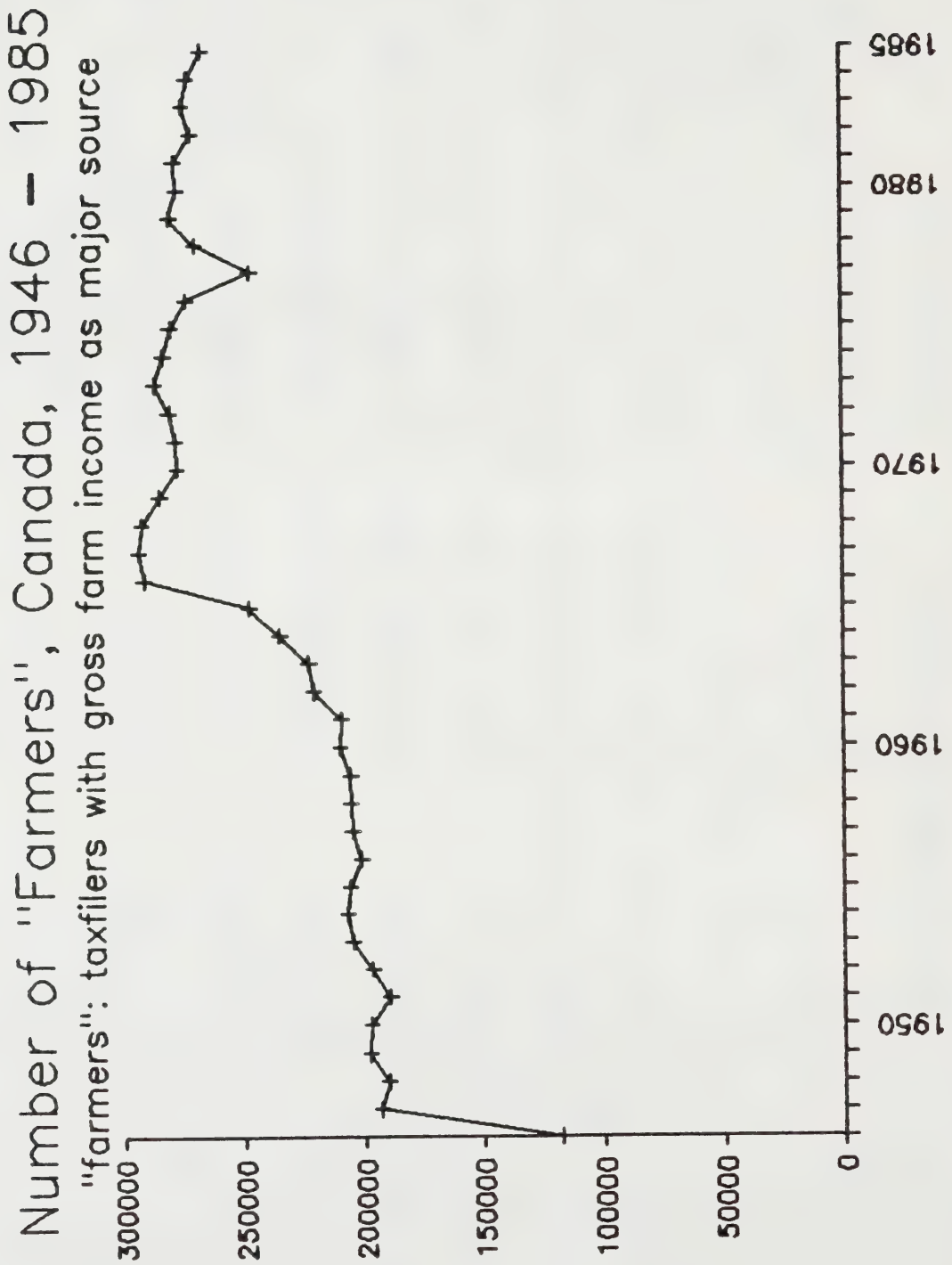
Figure 1

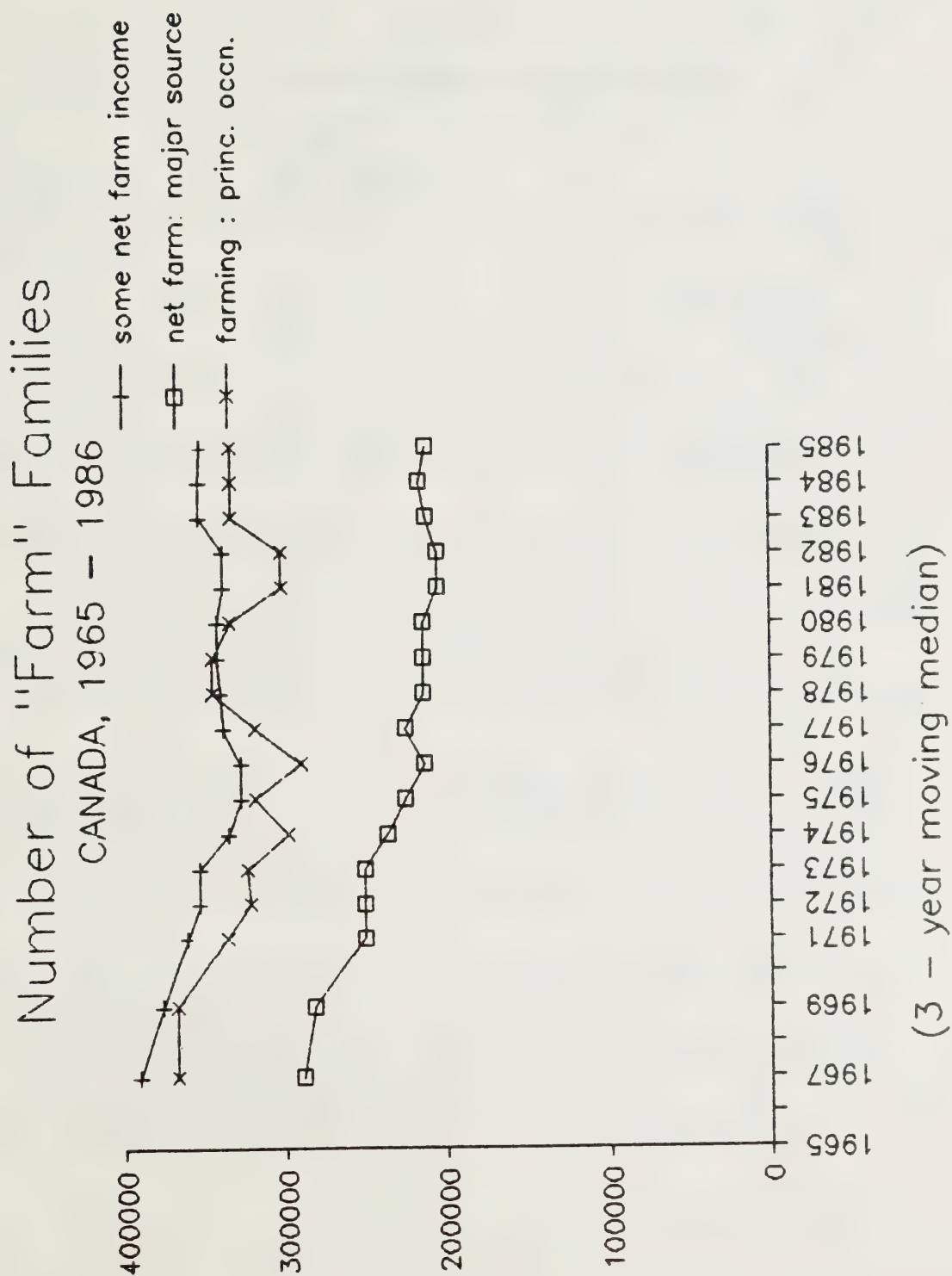Number of "Farmers", Canada, 1946 – 1985
"farmers": taxfilers with gross farm income as major source

Figure 2

Number of "Farm" Families
CANADA, 1965 – 1986

── some net farm income
─□─ net farm: major source
─✕─ farming : princ. occn.

(3 – year moving median)

Table 3

MARKET SHARES, CLASSIC AND NON-CLASSIC FARM ENTERPRISES

Typology	1971			1981	
	Number of farms	% of total		Number of farms	% of total
Classic					
Full-time family farms	43.1	67.7		44.3	66.2
Part-time family farms	5.2	6.4		6.7	7.7
Total share		74.1			73.9
Non-classic					
Semi-managerial	1.2	7.2		2.0	8.5
Independent managerial	0.3	5.8		0.6	6.9
Integrated managerial	0.1	2.3		0.3	3.4
Total share		15.3			18.8

Table 4

Typology of Census-farm Operators(1), Canada, 1971 and 1981

TYPOLOGY	1971		1981		Percent Change 1971 - 1981
	Number of Operators	Percent of Total	Number of Operators	Percent of Total	
1. Retired(2)	43,040	11.8	32,215	10.1	-25.1
2. Farming occupation(3)	234,455	64.0	194,715	61.3	-16.9
2.1 "Strict" full-time farmers(4)	145,145	39.6	130,300	41.0	-10.2
2.2 "Less strict" full-time farmers(5)	24,320	6.6	20,140	6.3	-17.2
2.3 All other	64,995	17.7	44,275	13.9	-31.9
3. Non-farming occupation	88,915	24.3	90,915	28.6	+2.2
3.1 "Strict" non-farm(6)	54,930	15.0	61,195	19.3	+11.4
3.2 "Less strict" non-farm(7)	21,660	5.9	18,895	5.9	-12.8
3.3 All other	12,300	3.4	10,825	3.4	-12.0
4. Total	366,410	100.0	317,850	100.0	-13.2

Source: Canada. Statistics Canada. Agriculture-Population Linkage, 1971 and 1981.
(1) Operators of institutions and community pastures are excluded.
(2) "Retired" refers to all operators 65 years of age or more. (They generally have an agricultural occupation or no occupation and sales less than the median level of sales).
(3) "Farming occupation" includes all operators under 65 years of age who reported their major occupation to be farmer, farm manager, farm foreman, farm worker, nursery worker, farm machinery or custom operator, other farming occupation or who did not report an occupation.
(4) "Strict full-time farmers" are operators reporting 0-96 days of work off-farm, net farm income is the major source of employment income and net farm income is positive.
(5) "Less strict full-time farmers" are operators reporting 0 - 96 days of work off-farm, net farm income is the major source of employment income, but net farm income is zero or negative.
(6) "Strict non-farm occupation" includes all operators under 65 years of age who reported a non-farming occupation, who reported 97 or more days work off-farm and net farm income is not the major source of income.
(7) "Less strict non-farm occupation" is as "strict" (footnote #6) except the operator reported 0 -96 days of work off-farm.

3. Who Tends to Use Computers on Farms?

This short review of a few articles is obviously not an exhaustive review of the literature but the observations of the authors are helpful for the subsequent discussion of the potential market for computer products.

Lasley and Bultena (1986) surveyed Iowa farmers in 1984 to ascertain farmer's opinions about innovative technologies. Regarding personal computers, they found,

> About one-half of the respondents (53%) supported personal computers for farm families but, surprisingly, 26 percent were undecided about their merits and 21 percent indicated they were opposed.
>
> These findings take on added significance in light of the often assumed widespread acceptability of ... farm computers among farmers. It appears that a significant proportion of farmers hold some reservations about even these "accepted" farm practices (Lasley and Bultena, 1986, p. 124).

They found younger farmers, higher educated farms, farmers with more acres operated, and farmers with higher gross sales to have a high acceptance of personal computers. The level of net income and amount of acres owned were not correlated with the acceptance of personal computers. However, the differences were not large.

> Farmers on large operations were just as likely to oppose these technologies as small farmers (Lasley and Bultena, 1986, p. 124)

Funk and Hudon (1988) surveyed 430 Ontario farmers in 1985 and used psychographic clustering techniques to segment farmers according to characteristics important for firms selling farm inputs. They aggregated farmers into four groups or clusters:

1. leading edge entrepreneurs (10 percent);
2. progressive (36 percent);
3. traditionalists (14 percent);
4. marginal majority (40 percent).

The top group were, or soon would be, using computers (Table 5). There was some agreement among the "progressive" group that they would be soon using

TABLE 5: Selected Characteristics of Ontario Farmers by Market Segmentation Cluster Profile

Name of Cluster

ITEM	Leading Edge Entrepreneurs	Progressive	Tradition-alists	Marginal Majority
Percentage of farmers in cluster	10%	36%	14%	40%
	CHARACTERISTICS			
Time of adoption	quite early	relatively early	later	later
Attitude toward short courses	really enjoy taking short courses	basically enjoy taking short courses	basically enjoy taking short courses	short courses not that important
Farming records	very good	good	average	poor
Cash flow statements	very good	good	average	poor
Enjoy keeping records	basically yes	basically yes	basically no	basically no
Do detailed cost analysis before making change	almost always	frequently	occasionally	occasionally
Now using, or will be using computer soon	agreement	some agreement	disagreement	disagreement
Involvement of wife	involved	not very involved	some involvement	not very involved
Age	fairly even distribution	fairly even distribution	fairly even distribution	fairly even distribution
Education	generally higher education	medium amounts of education	generally lower education	medium amounts of education
Gross income	high levels	medium to high	lower	lower
Farm type	higher percentage of mixed farms	higher percentage of cash crop farms	higher percentage of livestock farms	higher percentage of livestock farms

computers. The remaining one-half of the sample did not expect to be using computers. This tendency to adopt computers was directly associated with:

1. the quality of farm records;
2. the use of cash flow statements;
3. the frequency of doing a detailed cost analysis before making changes;
4. the educational level of the farmer;
5. the size of the farm's gross farm sales; and
6. whether or not the farmer enjoys keeping records.

Buggie (1977) suggested

> That a farmer's intelligence sets a broadly defined constraint to the complexity of decision-making that he is able to undertake. ... The level of intelligence ... is not significantly changed by education or experience during adult life. ... significance ... is an apparent conflict ... that education can enhance allocative ability.

Thus, Buggie is skeptical of the extent to which farm management education and extension can influence "allocative" ability. He suggests that the following two common assumptions are false:

> That knowledge of a procedure (such as a farm business management technique) is the only necessary human input to performance in conducting the process (i.e., managing the farm) ...

> That there is no necessary limit to what can be achieved by education of the individual, provided, of course, that adequate educational resources are available (Buggie, 1977, p. 54).

Buggie's conclusion is,

> As farmers have different levels of intellectual capacity, there is need for a range of models. Indeed, I suggest that there are many farmers whose intellectual capacity and other attributes are such that they are not going to significantly benefit from attempts to teach them decision-making/record-keeping procedures that are different to those they now use (Buggie, 1977, p. 55).

One issue regarding the use of computers on farms is the question whether the computer services will be provided within the farm firm or provided by non-farm firms. It was Coase (1937) who first articulated that activities remain within the firm for which the cost of supervision is less than the transaction cost of negotiating (and sometimes enforcing) a price in the market. There

would seem to be a market for the provision of computerized farm accounting services by non-farm firms. A non-computing example of this phenomenon is the present role of off-farm feed mills in the grinding of feed grain that used to be performed solely on farms.

Della Radcliffe, in a recent GRAINEWS article, described the inter-personal dynamics of a group that met daily for two weeks for the ostensible purpose of learning about micro computers. In fact, the major part of the group's discussion appeared to be how to analyse the farm business. The computer was not the end, it was the means to an end. This reminds me of one way that fostered the adoption of farm accounting books. Farm accounting "clubs"[1] were formed which used farm accounting books as the means to achieve the end of how to analyse the farm business. If Ms. Radcliffe's observations can be generalized, one way to promote on-farm computerized record-keeping is to promote farm business associations that are centered on a computerized analysis of farm business records.

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[1] *Examples in Manitoba were the Carman Farm Business Association and the Western Manitoba Farm Business Association.*

4. The Potential Market for Computer Products

4.1 Introduction

In this section, I plan to use the 1986 Census of Agriculture:

(1) to indicate the variables associated with the presence on farms of computers "used principally in managing your farm business"; and at the same time,

(2) to show the number and characteristics of farms that might be expected to adopt computer technology.

The 1986 Census of Agriculture requested the operator to indicate whether she/he had a computer "used principally in managing our farm business". At the Canada level, 7,500 operators, representing 2.6 percent of all census-farm operators reported a computer. The proportion varied somewhat across all provinces, ranging from a low of 1.6 percent in Prince Edward Island to 3.4 percent in British Columbia (Figure 3).

4.2 Size of Gross Farm Sales

As suggested above, one variable determining the use of computers is the size of farm in terms of size of gross farm sales. The larger the farm, the higher the proportion reporting a computer. At the Canada level in 1986, one percent of census-farms reported gross sales of $562,550 or over and 20 percent reported a computer (Table 6 and Figure 4). Alternatively, there are 2,000 farms in Canada with gross sales of $562,550 or over which do not yet own computers. The use of computers drops quickly as gross farm sales decline. For farms in the 95th to 98th percentile (gross sales of $235,384 to 562,549), only 10% reported a computer; 10,000 farms did not report computers at the time of the 1986 Census of Agriculture.

Figure 3

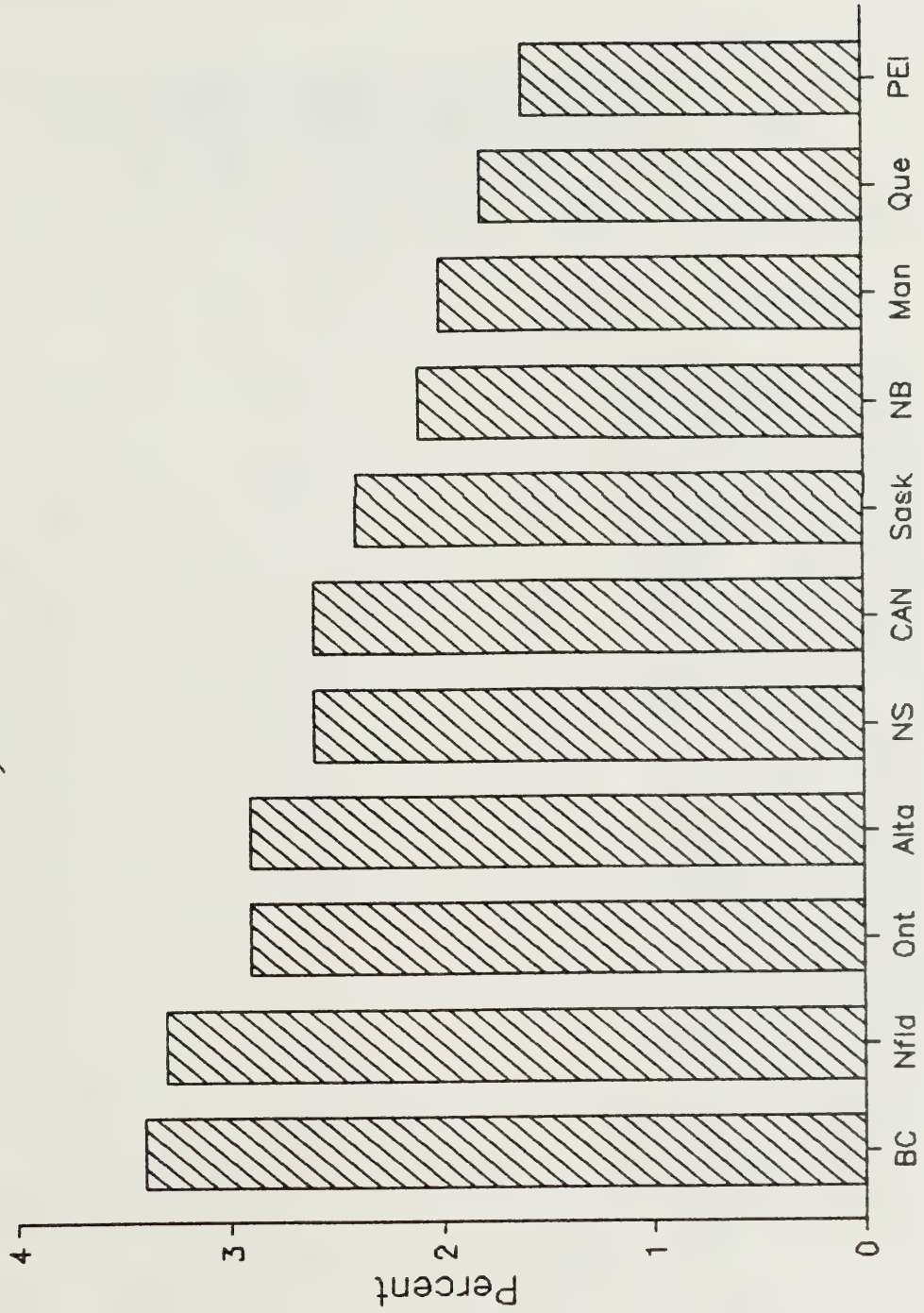Census-farms with Computers
by Province, 1986

Table 6

NUMBER AND PERCENT OF CENSUS-FARMS WITH COMPUTERS
"USED PRINCIPALLY IN MANAGING YOUR FARM BUSINESS"
BY SIZE CLASS OF GROSS FARM SALES, CANADA
(PROPRIETORSHIP, PARTNERSHIP, & FAMILY CORPORATIONS ONLY)
SOURCE: 1986 CENSUS OF AGRICULTURE
12 APRIL 1988   PAGE   11

	YES COMPUTER	NO COMPUTER	ALL (FAMILY) CENSUS-FARMS
AREA: T1000001	CANADA		
SALES LT $2167: PERCENTILES 1-9			
NUMBER OF CENSUS-FARMS.............	340	28,810	29,150
ROW PERCENT......................	1.2	98.8	100.0
SALES $2167 TO 5387: PERC 10-19			
NUMBER OF CENSUS-FARMS.............	355	28,805	29,160
ROW PERCENT......................	1.2	98.8	100.0
SALES $5388 TO 10560: PERC 20-29			
NUMBER OF CENSUS-FARMS.............	410	28,735	29,145
ROW PERCENT......................	1.4	98.6	100.0
SALES $10561 TO 18999: PERC 30-39			
NUMBER OF CENSUS-FARMS.............	425	28,420	28,845
ROW PERCENT......................	1.5	98.5	100.0
SALES $19000 TO 30276: PERC 40-49			
NUMBER OF CENSUS-FARMS.............	480	28,945	29,425
ROW PERCENT......................	1.6	98.4	100.0
SALES $30277 TO 46999: PERC 50-59			
NUMBER OF CENSUS-FARMS.............	530	28,490	29,020
ROW PERCENT......................	1.8	98.2	100.0
SALES $47000 TO 68640: PERC 60-69			
NUMBER OF CENSUS-FARMS.............	595	28,655	29,255
ROW PERCENT......................	2.0	97.9	100.0
SALES $68641 TO 99799: PERC 70-79			
NUMBER OF CENSUS-FARMS.............	775	28,355	29,130
ROW PERCENT......................	2.7	97.3	100.0
SALES $99800 TO 157081: PERC 80-89			
NUMBER OF CENSUS-FARMS.............	1,135	27,950	29,090
ROW PERCENT......................	3.9	96.1	100.0
SALES $157082 TO 235380: PERC 90-94			
NUMBER OF CENSUS-FARMS.............	885	13,585	14,465
ROW PERCENT......................	6.1	93.9	100.0
SALES $235381 TO 562549: PERC 95-98			
NUMBER OF CENSUS-FARMS.............	1,110	10,265	11,370
ROW PERCENT......................	9.8	90.3	100.0
SALES $562550 + : PERCENTILE 99 +			
NUMBER OF CENSUS-FARMS.............	490	1,955	2,440
ROW PERCENT......................	20.1	80.1	100.0
ALL SALES CLASSES			
NUMBER OF CENSUS-FARMS.............	7,525	282,955	290,485
ROW PERCENT......................	2.6	97.4	100.0

Figure 4

Census—farms with Computers
CANADA, 1986
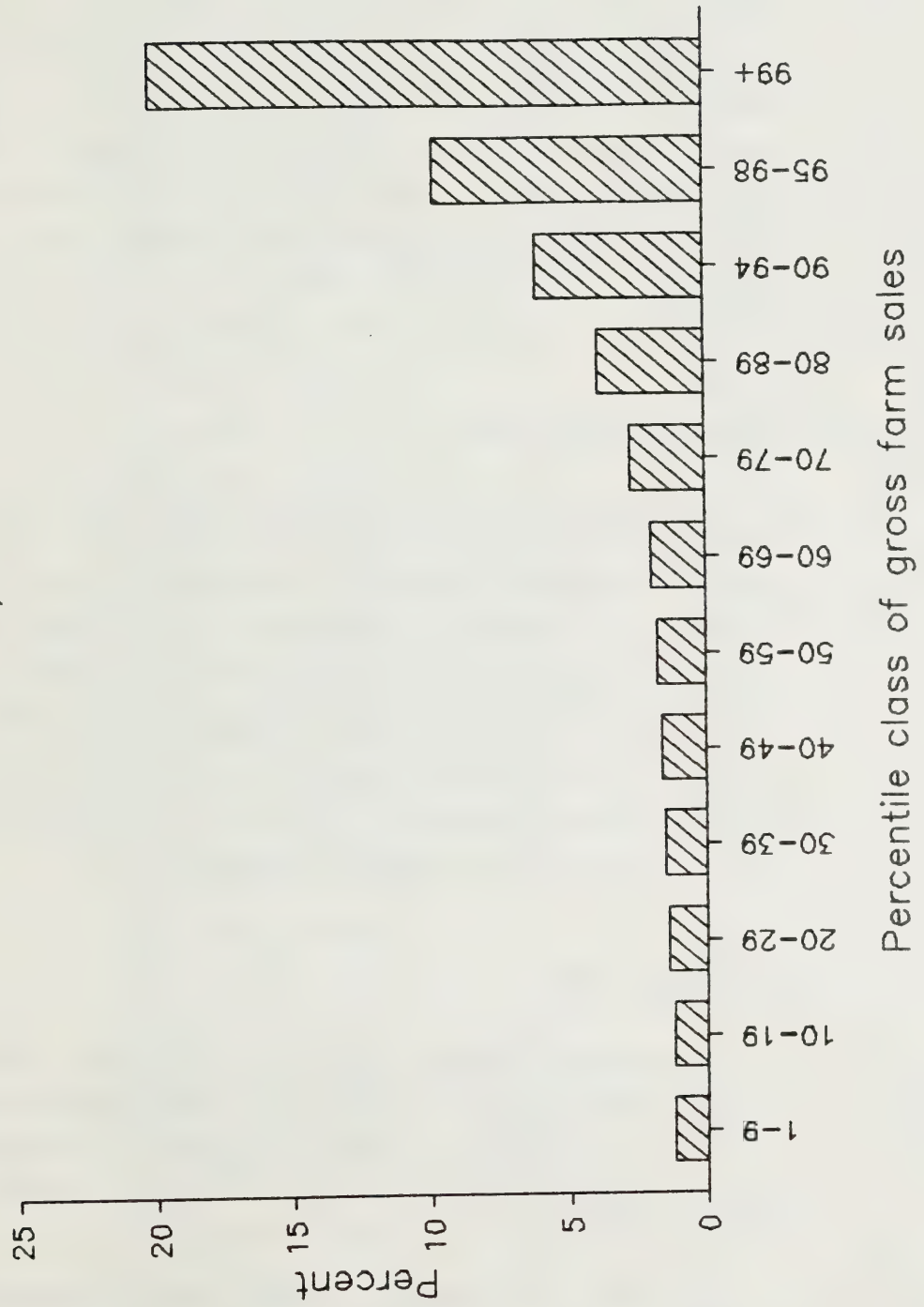
4.3   Major Type of Farm Enterprise

To determine if the proportion of operators using computers differs among farms according to the major type of farm enterprise, we have selected farms above the median gross sales ($30,277 or over) and classified them according to the product (or product group) providing 51 percent or more of gross sales. Specialty farms (eg. goats, mushrooms, nursery products, greenhouse, other livestock specialties, poultry) had over twice the average proportion with computers whereas farms specializing in dairy, grain, or cattle had a proportion with computers below the overall average (Table 7 and Figure 5).

4.4   Size of Milk Cow Herd

According to newspaper reports, computerized feeding systems for dairy herds is becoming popular. The Census of Agriculture did not request information on whether the feeding system is computerized. However, we can show the potential. At the Canada level, there are 1,000 dairy herds with over 100 milkcows (Table 8); 16 percent reported a computer "used principally in managing your farm business" (Figure 6). An additional 7,000 operators reported milkcow herds of 50 to 99 milkcows; 6 percent reported personal computers. The potential market here appears to about 7,000 operators with herds over 50 milkcows and no personal computer.

4.5   Type of Pig Herd

Computerized feeding systems for pig herds is not as popular, but some companies are apparently trying to design necklaces for pigs that will automatically trigger the feeder. Certainly, there is a market for analyzing business records and production records using personal computers.

To show the potential market, we have adopted the typology reported by Shomsky (1985) and updated the figures to 1986.
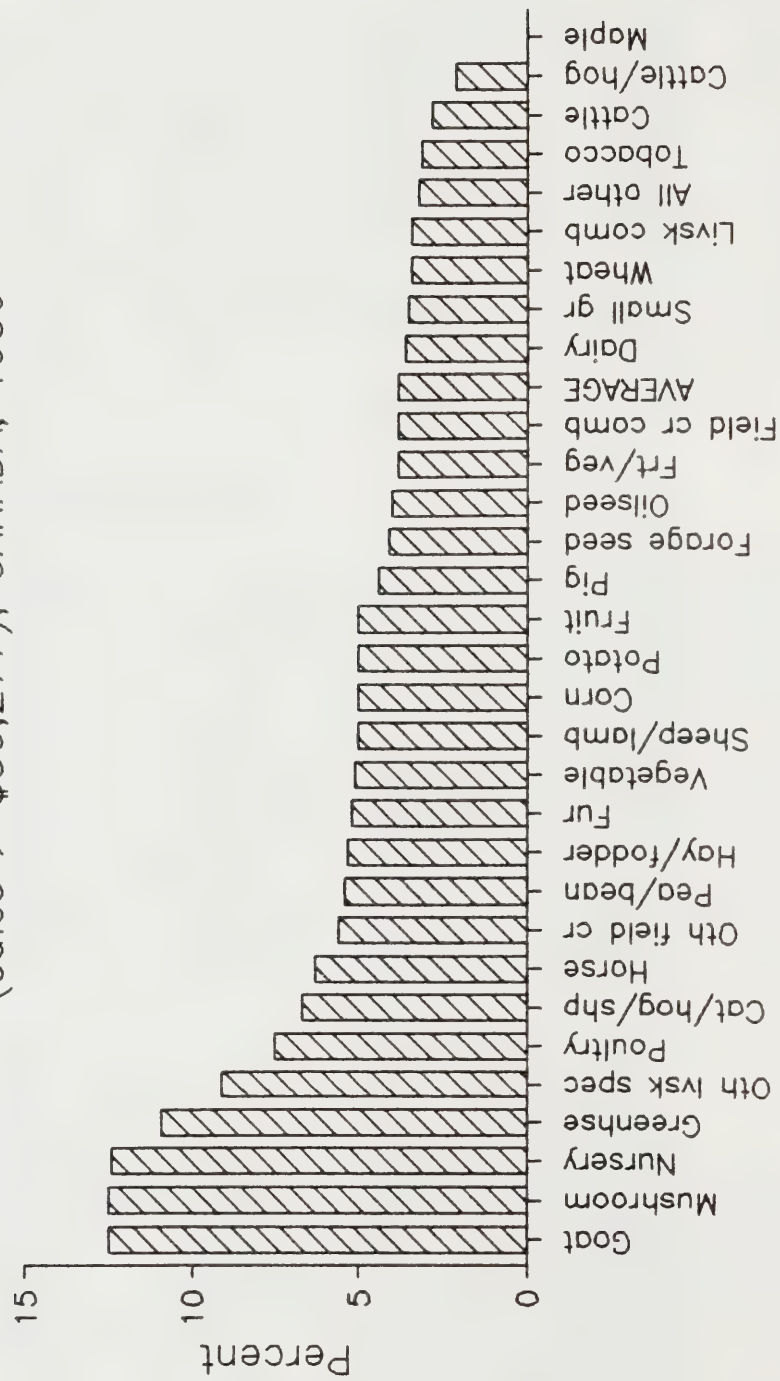
NUMBER AND PERCENT OF CENSUS-FARM OPERATORS WITH COMPUTERS
"USED PRINCIPALLY IN MANAGING YOUR FARM BUSINESS"
BY MAJOR TYPE OF FARM ENTERPRISE,
FOR FARMS WITH MEDIAN SALES OR OVER (SALES >= 030,277),
(PROPRIETORSHIP, PARTNERSHIP, & FAMILY CORPORATIONS ONLY)
SOURCE: 1986 CENSUS OF AGRICULTURE
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Table 7

	YES COMPUTER	NO COMPUTER	ALL (FAMILY) CENSUS-FARMS
AREA: T1000081	**CANADA**		
DAIRY			
NUMBER OF CENSUS-FARM OPERATORS.	1,030	27,760	28,795
ROW PERCENT.....................	3.6	96.4	100.0
CATTLE			
NUMBER OF CENSUS-FARM OPERATORS.	635	21,725	22,365
ROW PERCENT.....................	2.8	97.1	100.0
PIG			
NUMBER OF CENSUS-FARM OPERATORS.	405	8,865	9,265
ROW PERCENT.....................	4.4	95.7	100.0
POULTRY			
NUMBER OF CENSUS-FARM OPERATORS.	225	2,790	3,010
ROW PERCENT.....................	7.5	92.7	100.0
SHEEP LAMB			
NUMBER OF CENSUS-FARM OPERATORS.	10	180	200
ROW PERCENT.....................	5.0	90.0	100.0
GOAT			
NUMBER OF CENSUS-FARM OPERATORS.	5	35	40
ROW PERCENT.....................	12.5	87.5	100.0
HORSE			
NUMBER OF CENSUS-FARM OPERATORS.	50	745	795
ROW PERCENT.....................	6.3	93.7	100.0
FUR			
NUMBER OF CENSUS-FARM OPERATORS.	15	275	290
ROW PERCENT.....................	5.2	94.8	100.0
OTH LVSK SPEC			
NUMBER OF CENSUS-FARM OPERATORS.	35	355	385
ROW PERCENT.....................	9.1	92.2	100.0
WHEAT			
NUMBER OF CENSUS-FARM OPERATORS.	985	27,580	28,570
ROW PERCENT.....................	3.4	96.5	100.0
OILSEED			
NUMBER OF CENSUS-FARM OPERATORS.	270	6,430	6,705
ROW PERCENT.....................	4.0	95.9	100.0
CORN FOR GRAIN			
NUMBER OF CENSUS-FARM OPERATORS.	210	3,950	4,165
ROW PERCENT.....................	5.0	94.8	100.0
PEA BEAN			
NUMBER OF CENSUS-FARM OPERATORS.	10	175	185
ROW PERCENT.....................	5.4	94.6	100.0
SMALL GRAIN			
NUMBER OF CENSUS-FARM OPERATORS.	850	23,380	24,225
ROW PERCENT.....................	3.5	96.5	100.0
HAY FODDER			
NUMBER OF CENSUS-FARM OPERATORS.	15	275	285
ROW PERCENT.....................	5.3	96.5	100.0
FORAGE SEED			
NUMBER OF CENSUS-FARM OPERATORS.	15	355	370
ROW PERCENT.....................	4.1	95.9	100.0
TOBACCO			
NUMBER OF CENSUS-FARM OPERATORS.	50	1,580	1,625
ROW PERCENT.....................	3.1	97.2	100.0
POTATO			
NUMBER OF CENSUS-FARM OPERATORS.	65	1,245	1,310
ROW PERCENT.....................	5.0	95.0	100.0
OTH FIELD CROP			
NUMBER OF CENSUS-FARM OPERATORS.	5	90	90
ROW PERCENT.....................	5.6	100.0	100.0
FRUIT			
NUMBER OF CENSUS-FARM OPERATORS.	110	2,090	2,205
ROW PERCENT.....................	5.0	94.8	100.0
VEGETABLE			
NUMBER OF CENSUS-FARM OPERATORS.	95	1,785	1,880
ROW PERCENT.....................	5.1	94.9	100.0
FRUIT & VEGETABLE			
NUMBER OF CENSUS-FARM OPERATORS.	5	125	130
ROW PERCENT.....................	3.8	96.2	100.0
MUSHROOM			
NUMBER OF CENSUS-FARM OPERATORS.	15	105	120
ROW PERCENT.....................	12.5	87.5	100.0
GREENHOUSES			
NUMBER OF CENSUS-FARM OPERATORS.	180	1,475	1,655
ROW PERCENT.....................	10.9	89.1	100.0
NURSERY PRODUCTS			
NUMBER OF CENSUS-FARM OPERATORS.	65	465	525
ROW PERCENT.....................	12.4	88.6	100.0
MAPLE TREE			
NUMBER OF CENSUS-FARM OPERATORS.	-	105	110
ROW PERCENT.....................	-	95.5	100.0
CATTLE & HOG COMB			
NUMBER OF CENSUS-FARM OPERATORS.	35	1,670	1,705
ROW PERCENT.....................	2.1	97.9	100.0
CATTLE HOG SHEEP COMB			
NUMBER OF CENSUS-FARM OPERATORS.	5	75	75
ROW PERCENT.....................	6.7	100.0	100.0
LIVESTOCK COMB			
NUMBER OF CENSUS-FARM OPERATORS.	40	1,125	1,165
ROW PERCENT.....................	3.4	96.6	100.0
FIELD CROP COMB			
NUMBER OF CENSUS-FARM OPERATORS.	20	505	520
ROW PERCENT.....................	3.8	97.1	100.0
ALL OTHER TYPES			
NUMBER OF CENSUS-FARM OPERATORS.	65	1,935	2,010
ROW PERCENT.....................	3.2	96.3	100.0
ALL FARM TYPES			
NUMBER OF CENSUS-FARM OPERATORS.	5,520	139,245	144,765
ROW PERCENT.....................	3.8	96.2	100.0

Figure 5

Census-farms with Computers
(sales > $30,277), CANADA, 1986

Major type of farm enterprise

Percent

Table 8

NUMBER AND PERCENT OF CENSUS-FARM OPERATORS WITH COMPUTERS
"USED PRINCIPALLY IN MANAGING YOUR FARM BUSINESS"
BY SIZE OF MILK COW HERD, CANADA, 1986
(PROPRIETORSHIP, PARTNERSHIP, & FAMILY CORPORATIONS ONLY)
SOURCE: 1986 CENSUS OF AGRICULTURE
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	YES COMPUTER	NO COMPUTER	ALL (FAMILY) CENSUS-FARMS
AREA: T1000001	CANADA		
1 TO 24 MILKCOWS			
NUMBER OF CENSUS-FARM OPERATORS.	315	22,425	22,740
ROW PERCENT.....................	1.4	98.6	100.0
AGGREGATE MILKCOWS..............	1,848	189,614	191,462
PERCENT OF ALL MILKCOWS.........	0.1	13.2	13.4
25 TO 49 MILKCOWS			
NUMBER OF CENSUS-FARM OPERATORS.	450	18,370	18,820
ROW PERCENT.....................	2.4	97.6	100.0
AGGREGATE MILKCOWS..............	16,559	640,887	657,446
PERCENT OF ALL MILKCOWS.........	1.2	44.8	45.9
50 TO 99 MILKCOWS			
NUMBER OF CENSUS-FARM OPERATORS.	455	6,635	7,095
ROW PERCENT.....................	6.4	93.5	100.0
AGGREGATE MILKCOWS..............	30,528	416,970	447,821
PERCENT OF ALL MILKCOWS.........	2.1	29.1	31.3
100 OR MORE MILKCOWS			
NUMBER OF CENSUS-FARM OPERATORS.	155	835	985
ROW PERCENT.....................	15.7	84.8	100.0
AGGREGATE MILKCOWS..............	22,602	112,598	134,503
PERCENT OF ALL MILKCOWS.........	1.6	7.9	9.4
ALL MILKCOW SIZE CLASSES			
NUMBER OF CENSUS-FARM OPERATORS.	1,375	48,270	49,640
ROW PERCENT.....................	2.8	97.2	100.0
AGGREGATE MILKCOWS..............	71,379	1,359,972	1,431,209
PERCENT OF ALL MILKCOWS.........	5.0	95.0	100.0

Figure 6

Census-farms with Computers
CANADA, 1986
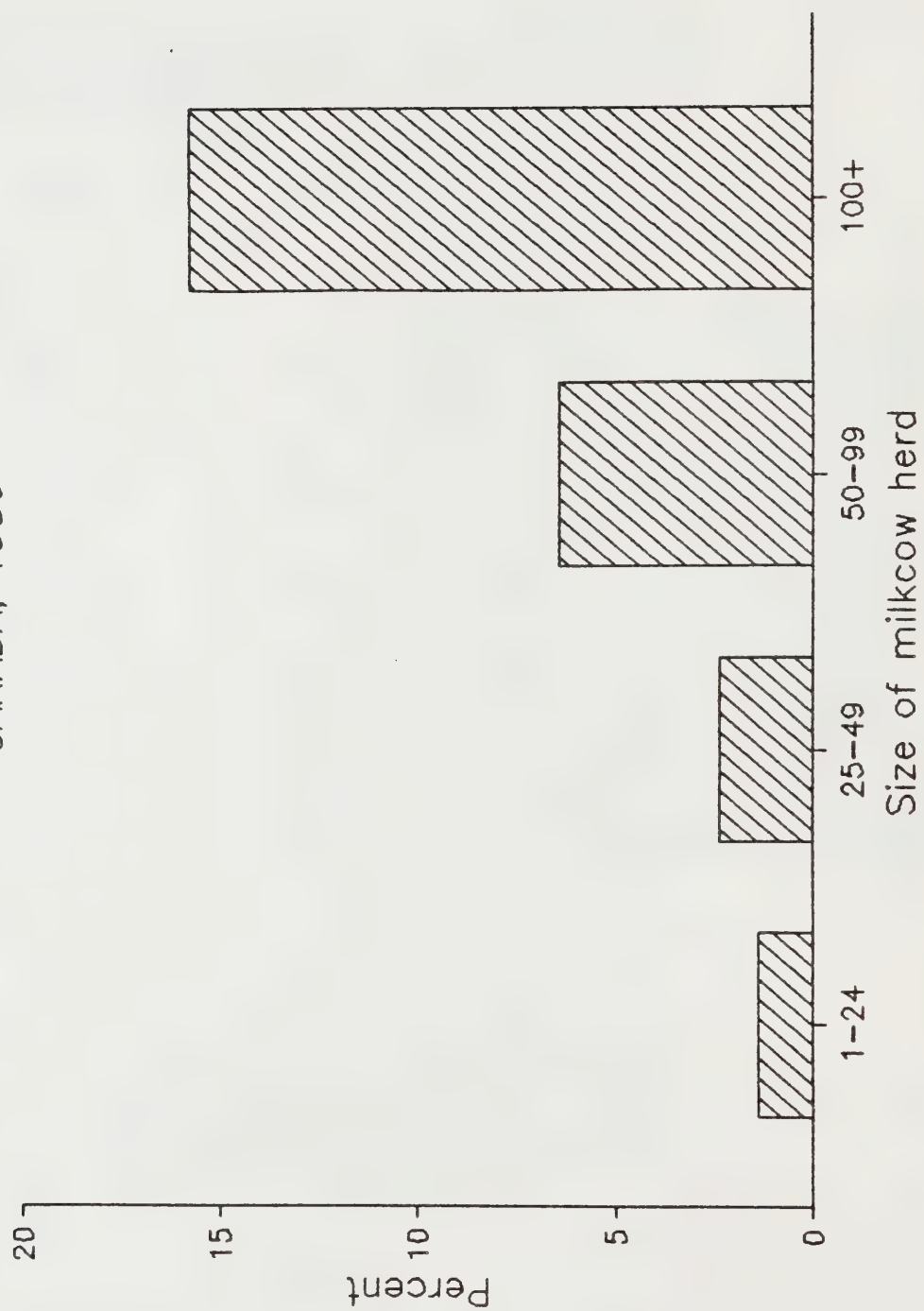
At the Canada level in 1986, there were 23,000 pig heads with over 20 pigs (Table 9). One-half were farrow to finish operations, one-quarter were farrowing enterprises, and one-quarter were finishing enterprises. Only about 3 percent of the operators with pig herds reported personnel computers (Figure 7).

4.6 Age of Operator

The study by Lasley and Bultena (1986) suggested younger operators were more inclined to adopt new technologies. However, the analysis by Funk and Hudon (1988) found a similar age distribution among the farmers in each of the four groups.

In 1986, younger operators had a greater tendency to report computers (Table 10 and Figure 8). The age group most likely to have a computer was the group of operators 35 to 39 years of age (4.2 percent).

4.7 Other Variables

One question is whether farms with a more complex type of legal organization might own a computer. Considering only farms with gross sales of $82,000 or over (the top 25 percent of census-farms), we find family corporations to be twice as likely to own computers (Table 11). However, this result may be due to the fact that family corporations also tend to have the larger gross sales within this category.

Male and female operators with gross sales of $82,000 or over are equally likely to own computers (Table 12).

New farmers (i.e. operators who started farming between June 3, 1985 and June 3, 1986) were equally likely as continuing farmers to own a computer (Table 13).

Table 9

NUMBER AND PERCENT OF CENSUS-FARM OPERATORS WITH COMPUTERS
"USED PRINCIPALLY IN MANAGING YOUR FARM BUSINESS"
BY TYPE OF PIG HERD (IF TOTAL PIGS > 20), CANADA, 1986
(PROPRIETORSHIP, PARTNERSHIP, & FAMILY CORPORATIONS ONLY)
SOURCE: 1986 CENSUS OF AGRICULTURE
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	YES COMPUTER	NO COMPUTER	ALL (FAMILY) CENSUS-FARMS
AREA: T1000001	CANADA		
FARROWING OPERATION			
NUMBER OF CENSUS-FARM OPERATORS.	70	5,705	5,780
ROW PERCENT.....................	1.2	98.7	100.0
AGGREGATE SOWS..................	5,755	263,613	269,637
PERCENT OF ALL SOWS.............	0.6	29.4	30.0
AGGREGATE MARKET PIGS > 45 LB...	1,487	37,844	39,379
PERCENT OF ALL MARKET PIGS......	-	0.7	0.8
FARROW TO FINISH OPERATION			
NUMBER OF CENSUS-FARM OPERATORS.	405	10,635	11,040
ROW PERCENT.....................	3.7	96.3	100.0
AGGREGATE SOWS..................	58,076	564,934	622,836
PERCENT OF ALL SOWS.............	6.5	63.0	69.4
AGGREGATE MARKET PIGS > 45 LB...	309,336	2,830,997	3,139,376
PERCENT OF ALL MARKET PIGS......	6.1	55.4	61.4
FINISHING OPERATION			
NUMBER OF CENSUS-FARM OPERATORS.	185	5,940	6,120
ROW PERCENT.....................	3.0	97.1	100.0
AGGREGATE SOWS..................	275	4,973	5,243
PERCENT OF ALL SOWS.............	-	0.6	0.6
AGGREGATE MARKET PIGS > 45 LB...	101,904	1,833,860	1,933,963
PERCENT OF ALL MARKET PIGS......	2.0	35.9	37.8
ALL PIG HERDS > 20 PIGS			
NUMBER OF CENSUS-FARM OPERATORS.	660	22,280	22,935
ROW PERCENT.....................	2.9	97.1	100.0
AGGREGATE SOWS..................	64,094	833,593	897,379
PERCENT OF ALL SOWS.............	7.1	92.9	100.0
AGGREGATE MARKET PIGS > 45 LB...	411,917	4,702,508	5,112,532
PERCENT OF ALL MARKET PIGS......	8.1	92.0	100.0

Figure 7
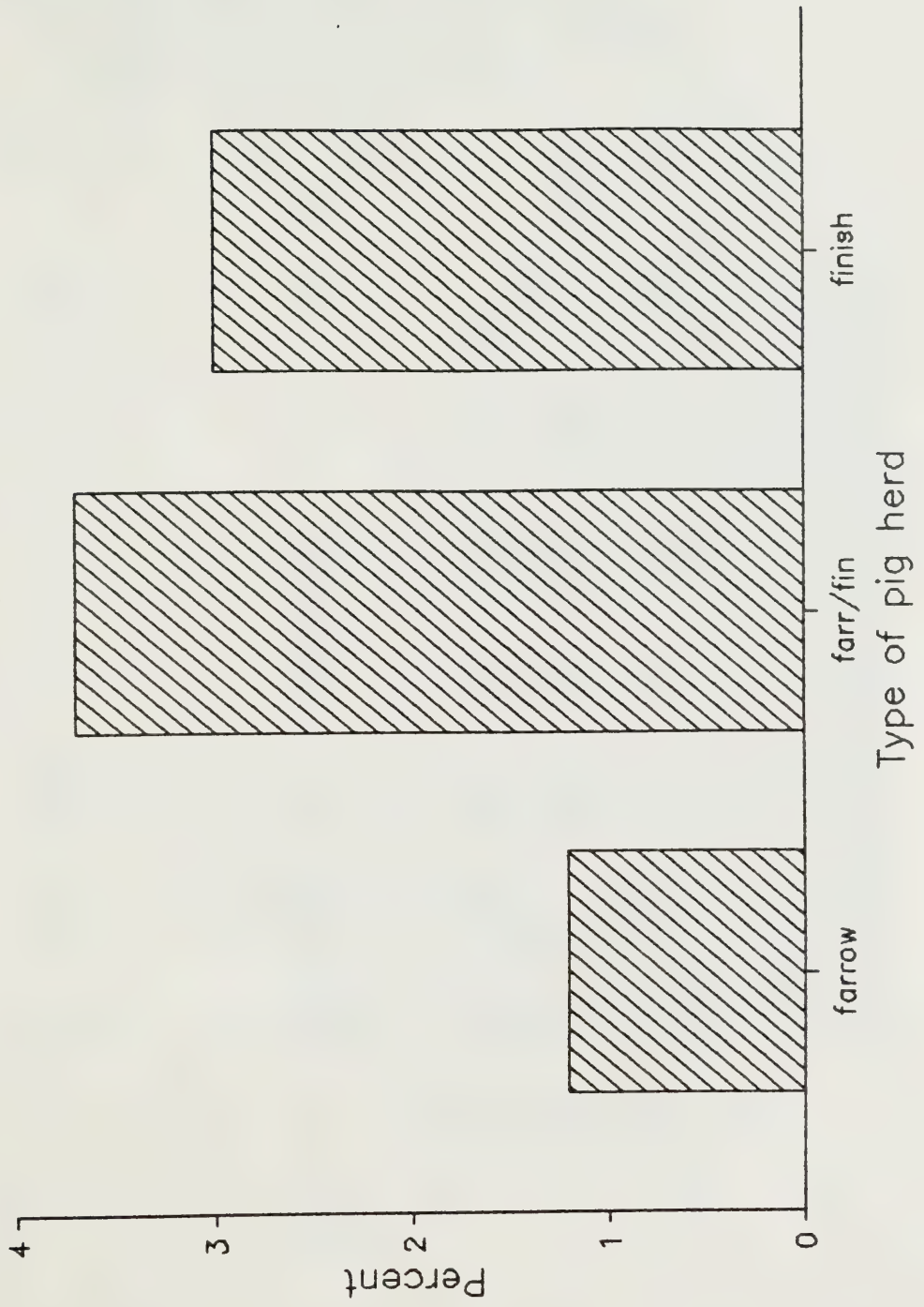

Census—farms with Computers
CANADA, 1986

Table 10

NUMBER AND PERCENT OF CENSUS-FARM OPERATORS WITH COMPUTERS
"USED PRINCIPALLY IN MANAGING YOUR FARM BUSINESS"
BY AGE OF OPERATOR, CANADA
(PROPRIETORSHIP, PARTNERSHIP, & FAMILY CORPORATIONS ONLY)
SOURCE: 1986 CENSUS OF AGRICULTURE
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	YES COMPUTER	NO COMPUTER	ALL (FAMILY) CENSUS-FARMS
AREA: T1000001	CANADA		
OPERATOR AGE UNDER 25			
NUMBER OF CENSUS-FARM OPERATORS.	150	6,945	7,090
ROW PERCENT.....................	2.1	98.0	100.0
OPERATOR AGE 25 - 29			
NUMBER OF CENSUS-FARM OPERATORS.	565	18,960	19,525
ROW PERCENT.....................	2.9	97.1	100.0
OPERATOR AGE 30 - 34			
NUMBER OF CENSUS-FARM OPERATORS.	1,060	28,125	29,185
ROW PERCENT.....................	3.6	96.4	100.0
OPERATOR AGE 35 - 39			
NUMBER OF CENSUS-FARM OPERATORS.	1,385	31,370	32,755
ROW PERCENT.....................	4.2	95.8	100.0
OPERATOR AGE 40 - 44			
NUMBER OF CENSUS-FARM OPERATORS.	1,315	32,720	34,035
ROW PERCENT.....................	3.9	96.1	100.0
OPERATOR AGE 45 - 49			
NUMBER OF CENSUS-FARM OPERATORS.	1,030	32,300	33,335
ROW PERCENT.....................	3.1	96.9	100.0
OPERATOR AGE 50 - 54			
NUMBER OF CENSUS-FARM OPERATORS.	725	34,040	34,765
ROW PERCENT.....................	2.1	97.9	100.0
OPERATOR AGE 55 - 59			
NUMBER OF CENSUS-FARM OPERATORS.	625	34,485	35,105
ROW PERCENT.....................	1.8	98.2	100.0
OPERATOR AGE 60 - 64			
NUMBER OF CENSUS-FARM OPERATORS.	365	28,635	29,000
ROW PERCENT.....................	1.3	98.7	100.0
OPERATOR AGE 65 - 69			
NUMBER OF CENSUS-FARM OPERATORS.	170	18,125	18,300
ROW PERCENT.....................	0.9	99.0	100.0
OPERATOR AGE 70 AND OVER			
NUMBER OF CENSUS-FARM OPERATORS.	130	17,255	17,380
ROW PERCENT.....................	0.7	99.3	100.0
ALL OPERATOR AGE CLASSES			
NUMBER OF CENSUS-FARM OPERATORS.	7,525	282,960	290,480
ROW PERCENT.....................	2.6	97.4	100.0

Figure 8
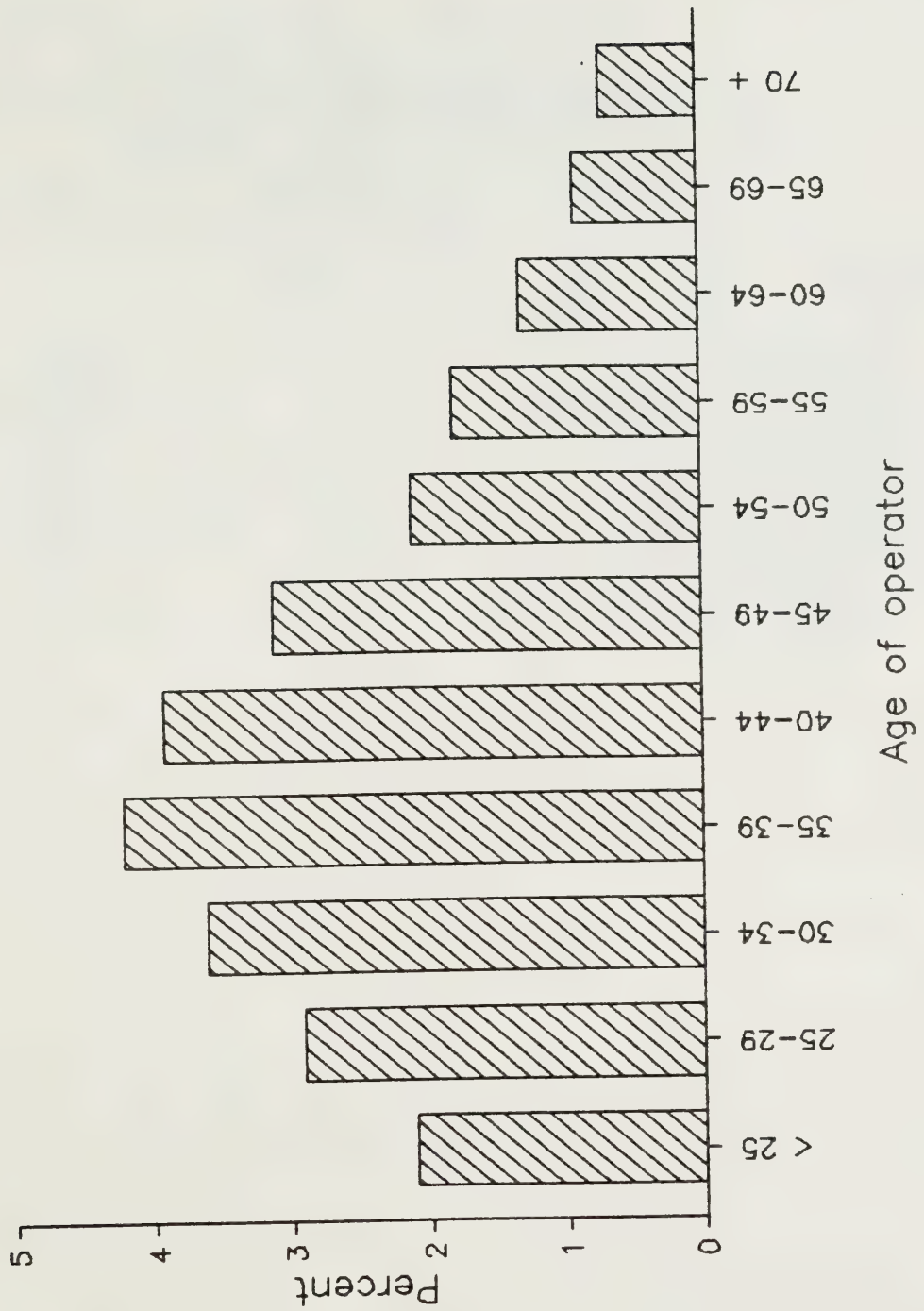

Census-farms with Computers
CANADA, 1986

Table 11

NUMBER AND PERCENT OF CENSUS-FARMS WITH COMPUTERS
"USED PRINCIPALLY IN MANAGING YOUR FARM BUSINESS"
BY TYPE OF FARM LEGAL ORGANIZATION,
FOR FARMS WITH GROSS SALES OF $82,000 OR OVER, CANADA
(PROPRIETORSHIP, PARTNERSHIP, & FAMILY CORPORATIONS ONLY)
SOURCE: 1986 CENSUS OF AGRICULTURE
28 APRIL 1988   PAGE   11

	YES COMPUTER	NO COMPUTER	ALL (FAMILY) CENSUS-FARMS
AREA: T1000001	CANADA		
INDIVIDUAL OR FAMILY HOLDING			
NUMBER OF CENSUS-FARMS..........	1,855	45,395	47,255
ROW PERCENT....................	3.9	96.1	100.0
PARTNERSHIP WRITTEN AGREEMENT			
NUMBER OF CENSUS-FARMS..........	395	5,860	6,250
ROW PERCENT....................	6.3	93.8	100.0
PARTNERSHIP NO WRITTEN AGREEMENT			
NUMBER OF CENSUS-FARMS..........	405	7,180	7,590
ROW PERCENT....................	5.3	94.6	100.0
FAMILY CORPORATION			
NUMBER OF CENSUS-FARMS..........	1,370	9,490	10,865
ROW PERCENT....................	12.6	87.3	100.0
ALL TYPES OF LEGAL ORGANIZATION			
NUMBER OF CENSUS-FARMS..........	4,030	67,925	71,955
ROW PERCENT....................	5.6	94.4	100.0

Table 12

NUMBER AND PERCENT OF CENSUS-FARMS WITH COMPUTERS
"USED PRINCIPALLY IN MANAGING YOUR FARM BUSINESS"
BY GENDER OF OPERATOR,
FOR FARMS WITH GROSS SALES OF $82,000 OR OVER, CANADA
(PROPRIETORSHIP, PARTNERSHIP, & FAMILY CORPORATIONS ONLY)
SOURCE: 1986 CENSUS OF AGRICULTURE
28 APRIL 1988   PAGE   11

	YES COMPUTER	NO COMPUTER	ALL (FAMILY) CENSUS-FARMS
AREA: T1000001		CANADA	
FEMALE OPERATOR			
NUMBER OF CENSUS-FARMS.	100	1,440	1,540
ROW PERCENT............	6.5	93.5	100.0
MALE OPERATOR			
NUMBER OF CENSUS-FARMS.	3,860	65,925	69,780
ROW PERCENT............	5.5	94.5	100.0
ALL OPERATORS			
NUMBER OF CENSUS-FARMS.	3,955	67,365	71,320
ROW PERCENT............	5.5	94.5	100.0

Table 13

NUMBER AND PERCENT OF CENSUS-FARMS WITH COMPUTERS
"USED PRINCIPALLY IN MANAGING YOUR FARM BUSINESS"
BY YEAR STARTED FARMING,
FOR FARMS WITH GROSS SALES OF $30,277 OR OVER, CANADA
(PROPRIETORSHIP, PARTNERSHIP, & FAMILY CORPORATIONS ONLY)
SOURCE: 1986 CENSUS OF AGRICULTURE
4 MAY 1988   PAGE   11

	YES COMPUTER	NO COMPUTER	ALL (FAMILY) CENSUS-FARMS
AREA: T1000001	CANADA		
STARTED FARMING JUNE 3/85 TO JUNE 3/86			
NUMBER OF CENSUS-FARMS................	95	2,695	2,790
ROW PERCENT..........................	3.4	96.6	100.0
STARTED FARMING BEFORE JUNE 3/85			
NUMBER OF CENSUS-FARMS................	5,420	136,555	141,975
ROW PERCENT..........................	3.8	96.2	100.0
ALL OPERATORS			
NUMBER OF CENSUS-FARMS................	5,520	139,250	144,765
ROW PERCENT..........................	3.8	96.2	100.0

Some difference in computer ownership is seen when operators are disaggregated by the language they first spoke and still understand. Operators with Dutch as a mother tongue are somewhat more likely to own computers and operators with Ukrainian as a mother tongue are somewhat less likely to own computers (Table 14). However, these results may change if we were to make the comparisons within age groups.

4.8 Do Farmers with Computers Have Lower Costs?

The 1986 Census of Agriculture allows one to calculate a net farm cash income by subtracting total cash expenses from gross farm sales. One of the expense items was "wages paid to family members". For the purposes of this analysis, net income is calculated as net farm cash income plus the wages paid to family members.

Considering census-farms with gross sales above the median (sales of $30,777 or more), we see that 17 percent (24,000 farms) report less than $5,000 of net farm cash income (before depreciation and before paying wages to family members) (Table 15). Interestingly, this group has the highest proportion (5.5 percent) with computers (Figure 9). This suggests that either:

(1) farmers with computers have higher costs; or
(2) farmers with computers have more accurate data on what their costs actually are.

A similar conclusion is obtained if we draw average cost curves for operators with computers and for operators without computers. We see that for almost all farm sizes, operators with computers have a higher cost per dollar of sales compared to operators without computers (Table 16 and Figure 10). This finding was consistent for farms regardless of the major type of farm enterprise (not reported here).

Table 14

NUMBER AND PERCENT OF CENSUS-FARMS WITH COMPUTERS
"USED PRINCIPALLY IN MANAGING YOUR FARM BUSINESS"
BY LANGUAGE FIRST SPOKEN AND STILL UNDERSTOOD,
FOR FARMS WITH GROSS SALES OF $30,277 OR OVER, CANADA
(PROPRIETORSHIP, PARTNERSHIP, & FAMILY CORPORATIONS ONLY)
SOURCE: 1986 CENSUS OF AGRICULTURE
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|	YES COMPUTER	NO COMPUTER	ALL (FAMILY) CENSUS-FARMS
AREA: T1000001 CANADA			
MOTHER TONGUE ENGLISH			
NUMBER OF CENSUS-FARMS..	3,850	86,345	90,190
ROW PERCENT.............	4.3	95.7	100.0
MOTHER TONGUE FRENCH			
NUMBER OF CENSUS-FARMS..	640	23,620	24,260
ROW PERCENT.............	2.6	97.4	100.0
MOTHER TONGUE GERMAN			
NUMBER OF CENSUS-FARMS..	320	10,100	10,420
ROW PERCENT.............	3.1	96.9	100.0
MOTHER TONGUE UKRAINIAN			
NUMBER OF CENSUS-FARMS..	75	4,425	4,500
ROW PERCENT.............	1.7	98.3	100.0
MOTHER TONGUE DUTCH			
NUMBER OF CENSUS-FARMS..	280	4,475	4,760
ROW PERCENT.............	5.9	94.0	100.0
ALL OTHER MOTHER TONGUES			
NUMBER OF CENSUS-FARMS..	355	10,275	10,640
ROW PERCENT.............	3.3	96.6	100.0
ALL OPERATORS			
NUMBER OF CENSUS-FARMS..	5,520	139,245	144,765
ROW PERCENT.............	3.8	96.2	100.0

Table 15

NUMBER AND PERCENT OF CENSUS-FARMS WITH COMPUTERS
"USED PRINCIPALLY IN MANAGING YOUR FARM BUSINESS"
BY SIZE OF NET FARM CASH INCOME (BEFORE DEPRECIATION)
(PLUS WAGES PAID TO FAMILY MEMBERS)
FOR FARMS WITH GROSS SALES OF $30,777 OR OVER, CANADA
(PROPRIETORSHIP, PARTNERSHIP, & FAMILY CORPORATIONS ONLY)
SOURCE: 1986 CENSUS OF AGRICULTURE
28 APRIL 1988   PAGE   11

	YES COMPUTER	NO COMPUTER	ALL (FAMILY) CENSUS-FARMS
AREA: T1000001	CANADA		
NET CASH INC + FAM WAGES < -$5000			
NUMBER OF CENSUS-FARMS...............	1,345	23,015	24,365
ROW PERCENT.........................	5.5	94.5	100.0
NET CASH INC + FAM WAGES -$5000 TO 0			
NUMBER OF CENSUS-FARMS...............	250	7,840	8,085
ROW PERCENT.........................	3.1	97.0	100.0
NET CASH INC + FAM WAGES $1 TO 5000			
NUMBER OF CENSUS-FARMS...............	310	10,750	11,060
ROW PERCENT.........................	2.8	97.2	100.0
NET CASH INC + FAM WAGES $5K - 9999			
NUMBER OF CENSUS-FARMS...............	370	13,035	13,400
ROW PERCENT.........................	2.8	97.3	100.0
NET CASH INC + FAM WAGES $10K - 19999			
NUMBER OF CENSUS-FARMS...............	690	26,255	26,945
ROW PERCENT.........................	2.6	97.4	100.0
NET CASH INC + FAM WAGES $20000 +			
NUMBER OF CENSUS-FARMS...............	2,540	57,660	60,200
ROW PERCENT.........................	4.2	95.8	100.0
ALL NET FARM CASH INCOME CLASSES			
NUMBER OF CENSUS-FARMS...............	5,505	138,555	144,060
ROW PERCENT.........................	3.8	96.2	100.0

Figure 9

Census-farms with Computers
(sales $30,277 +), CANADA, 1986
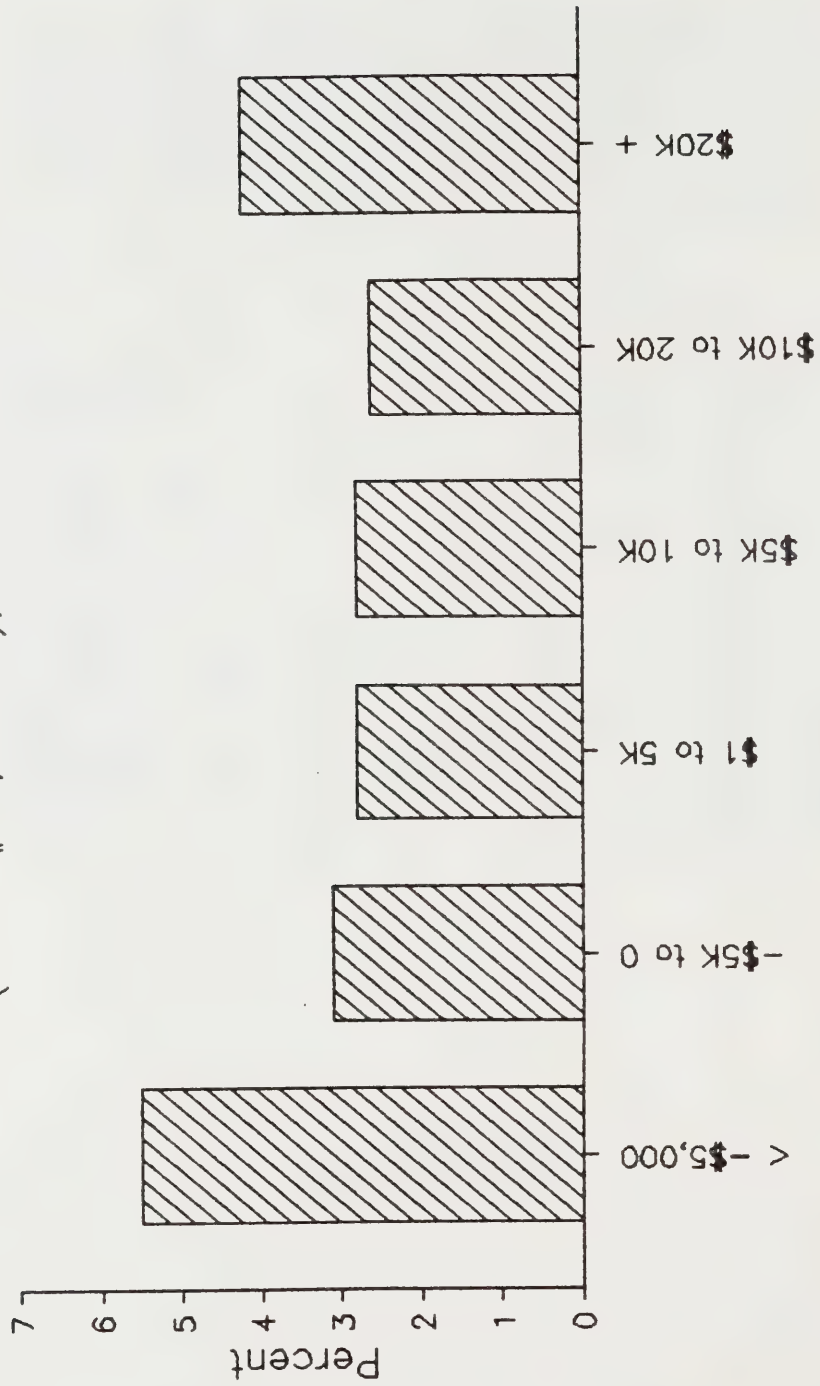
Net cash farm inc (+ fam wages)

Table 16. Cash Cost per Dollar of Sales, by Size of Gross Farm Sales, by Presence of Computer on the Farm(1), Canada, 1986

Item	Percentile class of gross farm sales												
	1 - 9	10 - 19	20 - 29	30 - 39	40 - 49	50 - 59	60 - 69	70 - 79	80 - 89	90 - 94	95 - 98	99 +	Total
	Size class of gross farm sales												
	under $2,167	$2,167 to 5,387	$5,387 to 10,560	$10,561 to 18,999	$19,000 to 30,276	$30,277 to 46,999	$47,000 to 68,640	$68,641 to 99,799	$99,800 to 157,081	$157,082 to 235,380	$235,381 to 562,549	$562,550 and over	Total
all census-farms													
- number of census-farms	29,150	29,160	29,140	28,845	29,420	29,020	29,250	29,125	29,085	14,465	11,370	2,440	290,480
- percent of total	10	10	10	10	10	10	10	10	10	5	4	1	100
- cumulative percent	10	20	30	40	50	60	70	80	90	95	99	100	100
- average cost per $ of sales	7.76	2.33	1.51	1.14	.95	.84	.78	.74	.74	.75	.78	.82	1.76
- std. dev. of cost per $ sales	17.67	2.85	1.37	.86	.59	.43	.35	.29	.25	.23	.22	.23	6.06
- cost plus 1 std. dev.	25.42	5.18	2.89	2.00	1.53	1.27	1.13	1.03	.99	.98	1.00	1.05	7.82
- cost minus 1 std. dev.	-9.91	-.52	.14	.27	.36	.40	.43	.46	.48	.52	.56	.59	-4.30
operators with a computer(1)													
- number of census-farms	340	355	410	430	480	530	595	775	1,140	880	1,110	485	7,525
- percent of total	5	5	5	6	6	7	8	10	15	12	15	6	100
- cumulative percent	5	9	15	20	27	34	42	52	67	79	94	100	100
- average cost per $ of sales	15.52	3.20	1.98	1.45	1.10	1.02	.89	.83	.77	.79	.79	.82	1.72
- std. dev. of cost per $ sales	40.97	3.29	2.31	2.02	.69	.71	.55	.48	.26	.27	.22	.30	9.25
- cost plus 1 std. dev.	56.49	6.49	4.29	3.47	1.79	1.73	1.44	1.31	1.03	1.06	1.01	1.11	10.97
- cost minus 1 std. dev.	-25.45	-.09	-.33	-.57	.41	.31	.34	.36	.51	.52	.57	.52	-7.54
operators without a computer													
- number of census-farms	28,810	28,800	28,730	28,415	28,945	28,490	28,655	28,360	27,950	13,585	10,260	1,950	282,960
- percent of total	10	10	10	10	10	10	10	10	10	5	4	1	100
- cumulative percent	10	20	31	41	51	61	71	81	91	96	99	100	100
- average cost per $ of sales	7.67	2.32	1.51	1.13	.94	.83	.78	.74	.73	.75	.78	.82	1.76
- std. dev. of cost per $ sales	17.18	2.84	1.36	.83	.59	.42	.35	.28	.25	.23	.22	.21	5.95
- cost plus 1 std. dev.	24.85	5.16	2.86	1.97	1.53	1.26	1.12	1.02	.98	.98	1.00	1.03	7.71
- cost minus 1 std. dev.	-9.52	-.52	.15	.30	.36	.41	.43	.46	.48	.52	.56	.62	-4.19

Source: Canada. Statistics Canada. Census of Agriculture, 1986.

(1) Presence of a computer "used principally in managing your farm business"

Note : "Costs" are all cash costs except wages paid to family members

Figure 10

Cost per $ of Sales
CANADA, 1986, all farms
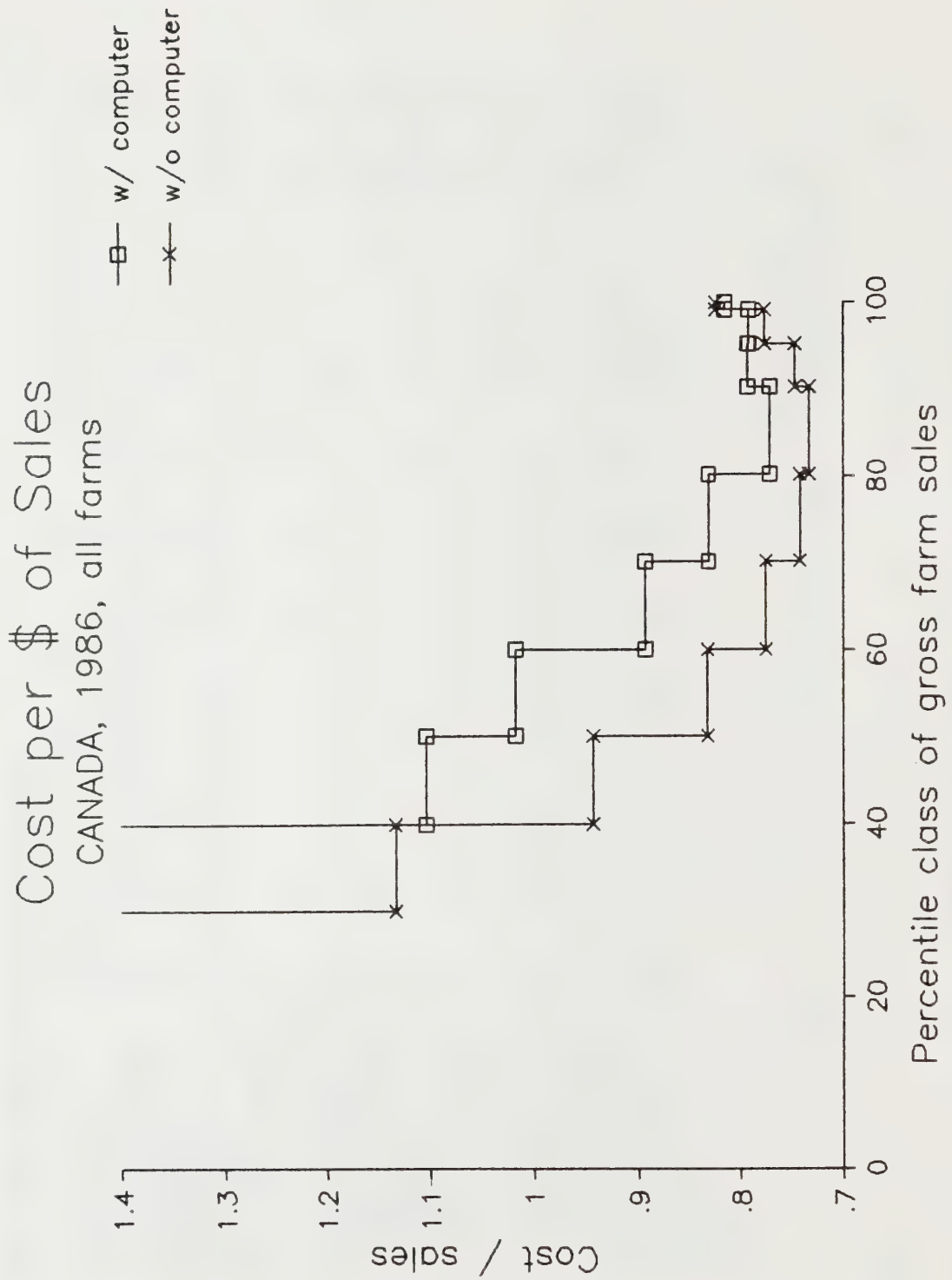
6. Conclusion

According   to the   1986 Census of Agriculture, only a small proportion of all census-farm operators have a computer that is used "principally in managing your   farm   business".   This   paper   has shown some of the variables that are associated with the use of computers on farms and has suggested the size of the remaining potential market for computer products.

REFERENCES

Bollman, Ray D., Pamela Smith and Monica Tomiak (1988), "Characteristics of Family-Sustaining Farms", Paper prepared for presentation to the World Congress for Rural Sociology, (draft, March).

Buggie, Geoffrey J. (1977), "Allocative Ability and Farm Management: A Comment", _Review of Marketing and Agricultural Economics_, Vol. 45, No. 1/2 (March), pp. 51-56.

Clemenson, Heather A. and Ray D. Bollman (1985), "A Profile of Managers of Agricultural Resources", Paper presented to the International Conference 'Management of Rural Resources: Problems and Policies', University of Guelph, July 14-20. Published as "Les agriculteurs canadiens des années 1980", _Cahiers de recherche sociologique_, Vol. 5, No. 1, (printemps, 1987), pp. 70-102.

Coase, R. (1937), "The Nature of the Firm", _Economica_, Reprinted in Stigler and Boulding (ed.), _Readings in Price Theory_.

Ehrensaft, P. and Ray D. Bollman (1985), "The Farm Management Input and Structural Change in Modern Agriculture", _Proceedings of the Canadian Agricultural Outlook Conference_, December, pp. 156-166.

Funk, Thomas F. and Maryse J. Hudon (1988), "Psychographic Segmentation of the Farm Market", _Agribusiness_, Vol. 4, No. 2, pp. 119-141.

Lasley, Paul and Gordon Bultena (1986), "Farmers' Opinions about Third-wave Technologies", _American Journal of Alternative Agriculture_ (summer), Vol. 1, No. 3, pp. 122-126.

Shumsky, Mike (1985), _The Changing Profile of the Canadian Pig Sector_, (Ottawa: Statistics Canada, Agriculture Division, Working Paper No. 9, Catalogue Number 21-521E).

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